

(51) International Patent Classification ⁶ : G09F 3/10, 3/02, B31D 1/02, B41M 5/38	A1	(11) International Publication Number: WO 95/31800
		(43) International Publication Date: 23 November 1995 (23.11.95)

Published
With international search report.

A label stock includes a thermal transfer facestock and a thermal transfer ribbon that are laminated together. The facestock has a front face for receiving thermal transfer ink and a back face covered by an adhesive. The ribbon has a front face covered by thermal transfer ink and a back face covered by a release. The facestock and ribbon are laminated and wound together into a roll so that the ribbon also functions as a conventional release liner.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

- 1 -

TITLE**LAMINATED THERMAL TRANSFER PRINTABLE LABELS****TECHNICAL FIELD**

The invention relates to the fields of label making and printing. The fields are related by combining elements of thermal transfer printing with label making.

BACKGROUND

Thermal transfer printing is a type of non-impact printing in which controlled concentrations of heat are used to melt ink from a ribbon onto a print medium. The ribbon is a thin film or paper that readily transfers heat from its back face, which engages heating elements of a printing mechanism, to its front face, which is coated with a wax- or resin-bound ink. The print medium has a front face that is made to receive the melted ink.

One use of thermal transfer printing is for printing self-adhesive labels, which can be made with thermal transfer paper or film facestocks. The front face of the facestock must be absorptive to prevent the ink from smearing yet very smooth to prevent discontinuities in the printed image. Coating materials, such as calcium carbonate and calcinated clay pigments, are often used to increase absorptivity.

A back face of the facestock is coated with an adhesive for applying a length of the facestock to another article. A liner having a release coating protects the adhesive and allows the facestock to be wound into a roll of label stock prior to use. The liner also allows the

- 2 -

facestock to be divided into individual labels that are carried by the liner.

The thermal transfer ribbon and the lined facestock are fed from different spools into a thermal transfer printer. The front face of the ribbon is registered in contact with the front face of the facestock between a thermal print head and a platen. Under light pressure, heat from the print head causes the ink to melt from the ribbon and be absorbed by the facestock. The ribbon is rewound onto a take-up spool for disposal. Individually printed labels can be dispensed either separately from or together with the liner. In the former case, the liner is rewound onto a take-up spool for disposal. In the latter case, sections of the liner must be discarded individually after the labels are removed.

However, the liners do not readily degrade, and disposal can be expensive. The liners are relatively costly to make and account for up to 60 percent of the size and weight of label stock rolls. The additional weight increases shipping costs, as well as the weight of portable thermal transfer printers. Also, many printer dispensing failures occur because of difficulties separating labels from the liners.

SUMMARY OF INVENTION

My invention provides for replacing conventional release liners of thermal transfer printable label stock with specially adapted thermal transfer ribbons. A release coating is applied to a back face of the thermal transfer ribbon, and the ribbon is laminated together with a self-adhesive facestock in place of the release liner. Thus, in addition to the function of carrying ink, the ribbon also functions as a release liner for protecting an adhesive layer of the facestock.

- 3 -

A single roll of laminated ribbon and facestock replaces separate rolls of ribbon and lined facestock. This reduces inventory items, packaging requirements, and shipping costs and makes planning easier because the required amount of ribbon is laminated together with the facestock.

Printer drive mechanisms can be simplified by eliminating one of two feed spools for conventional ribbons and facestock, as well as by eliminating a take-up spool for conventional liners. Operation of the printers is also simplified because only one feed spool requires loading, and the ribbon and facestock are used up together. Further, dispensing failures can be reduced because the adhesive layer of the facestock is separated from the release layer of the ribbon prior to printing.

In another respect, my invention can be understood to include two substrates. A first of the substrates, which forms the facestock, has a front face that is adapted for receiving thermal transfer ink and a back face that is covered with a layer of adhesive. A second of the substrates, which forms the thermal transfer ribbon, has a front face that is covered with a layer of the thermal transfer ink and a back face that is covered by a layer of release. The facestock and ribbon substrates are laminated and wound together into coils such that the adhesive layer of the facestock contacts the release layer of the ribbon.

The contact between the adhesive and release layers can take place either within each coil or between adjacent coils. For example, one version of my invention laminates the adhesive and release layers together prior to winding. Another version laminates the front face of the facestock against the ink layer of the ribbon so that contact between the release and adhesive layers occurs only upon winding.

Regardless of which way the two substrates are laminated together before winding, the front face of the

- 4 -

facestock must be registered in contact with the ink layer of the ribbon during printing. Accordingly, the adhesive and release layers are separated either within each coil or between adjacent coils prior to printing. A binder such as fugitive adhesive or static cling can be used to tack the two substrates together for printing.

The facestock can be cut against the ribbon similar to cutting against conventional liners. Cutting divides the facestock into individual labels that are carried by the ribbon. The individual labels can be gripped by the fugitive adhesive to maintain their proper registration with the ribbon. Preferably, the fugitive adhesive is applied directly on the front face of the ribbon in strips that extend along outer edges of the ribbon. Gaps in the strip allow air to escape between the two substrates. The fugitive adhesive exhibits slightly higher bonding strength between the front faces of the substrates than is exhibited by the adhesive and release layers between the back faces of the substrates. This assures that individual labels will remain registered with the ribbon while being unwound into the printer.

DRAWINGS

FIG. 1 is a diagram of a system for making a roll of my new thermal transfer printable label stock.

FIG. 2 is a cross-sectional side view through one example of a roll of my label stock in which layers are drawn with exaggerated thickness.

FIG. 3 is a cross-sectional end view taken along line 3-3 of FIG 2.

- 5 -

FIG. 4 is a partially cut-away plan view of the same label stock showing a pattern of adhesive between the layers.

FIG. 5 is a cross-sectional side view of another example of a roll of my label stock, also drawn with layers of exaggerated thickness.

FIG. 6 is a cross-sectional end view taken along line 6-6 of FIG. 5.

FIG. 7 is a diagram of a printing system for individually printing and dispensing labels from the label stock of FIGS. 2-4.

FIG. 8 is a diagram of a printing system for individually printing and dispensing labels from the label stock of FIGS. 5 and 6.

FIG. 9 is a diagram of an internal transport system for a thermal printer.

DETAILED DESCRIPTION

My new thermal transfer printable label stock can be made according to the system of FIG. 1 from starting materials such as a roll 10 of thermal transfer facestock 12 and a roll 14 of thermal transfer ribbon 16. A first embodiment of the new label stock is shown in FIGS. 2-4.

The facestock 12, which has front and back faces 26 and 28, is preferably a paper substrate that absorbs thermal transfer inks. The front face 26 of the facestock 12 can be coated to increase absorptivity or to improve appearance. Other facestock substrates can be made from films, metals, ceramics, and glass.

- 6 -

The thermal transfer ribbon 16, which has front and back faces 36 and 38, is preferably made from a polyester film substrate. The front face 36 of the ribbon 16 is coated with a resin- or wax-bound ink 18. Other ribbon or liner materials, including resin or paper materials having higher melting points than the bound ink 18, could also be used.

A printer 20, which can be either a variable or a static information type printer but is preferably a press, operates "in line" on the facestock 12. In fact, either thermal or non-thermal printing could be performed. Ink 24 or other marking material can be applied by the printer 20 in various patterns and colors to the front or back faces 26 or 28 of the facestock 12. For example, logos, forms, or security markings can be applied in predetermined positions on the facestock 12. A water-based flexo ink that is heat and air dried is preferred.

A first adhesive coater 22 and a laminator 32 join the facestock 12 and the ribbon 16. The adhesive coater 22 is arranged to apply a fugitive adhesive 40 in a predetermined pattern to the front face 36 of the ribbon 16. The predetermined pattern includes coatings that cover the entire front face 36. The laminator 32 aligns and presses the facestock 12 and ribbon 16 together.

According to the embodiment of FIGS. 2-4, the front face 26 of the facestock is laminated against the front face 36 of the ribbon. Preferably, the fugitive adhesive 40 is applied in strips to edges of the ribbon 16 for providing a temporary bond between the front faces 26 and 36 of the ribbon and facestock. Gaps 42 allow trapped air to escape between the front faces 26 and 36. The fugitive adhesive 40 can be cured by air or radiation.

A release coater 44, a cutter 46, and a second adhesive coater 48 complete the exemplary in-line operations. The release coater 44 applies a layer of release

- 7 -

34 on the back face 38 of the ribbon. The cutter 46 divides the facestock 12 with cuts 54 into individual labels 50. The adhesive coater 48 applies a layer of adhesive 30 to the back face 28 of the facestock.

The release 34 is preferably a radiation curable, silicone-based material that exhibits little bonding to the adhesive 30 but bonds tightly to the ribbon 16. Other release materials including resins, waxes, and oils can be selected for use with particular adhesives.

The cutter 46 is preferably a die cutting tool for cutting the facestock 12 against the ribbon 16. To enhance the cutting action, the facestock 12 can be a paper that splits apart upon partial penetration of the cutter 46 according to a so-called "butt" cutting technique. On the other hand, the ribbon 16, which functions as a liner for transporting the individual labels 50, preferably resists splitting apart upon partial penetration of the cutter 46. These cutting properties of the facestock 12 and the ribbon 16 widen tolerances for operating the cutter 46.

The adhesive 30 is preferably a pressure-sensitive adhesive that is applied as a hot melt. However, solvent- or water-based adhesives using acrylics, polymers, and rubber bases and which are dried by air or radiation could also be used. Other applications may require the adhesive 30 to be applied in a special pattern or to exhibit other properties such as co-adhesion, repositionability, removability, or resistance to cold.

The completed label stock 56 is wound into a roll 52 in which the layer of adhesive 30 in one coil of the roll contacts the layer of release 34 in another coil. The layer of release 34 also forms the outermost layer of the roll 52. However, the completed label stock 56 could also be wound with the adhesive layer 30 forming the outermost layer.

- 8 -

The fugitive adhesive 40 is preferably applied just prior to laminating the facestock 12 and ribbon 16, and the adhesive 30 is preferably applied just prior to winding completed label stock 56 into the roll 52. This minimizes exposure of the in-line system to the adhesives 40 and 30, which can contaminate moving parts of the system. Also, the fugitive adhesive 40 is formulated with respect to the adhesive 30 to form a temporary bond between the front faces 26 and 36 of the facestock and ribbon that is stronger than the releasable bond between the back faces 28 and 38 of the facestock and ribbon. This assures that the individual labels 50 remain attached to the ribbon 16 while the label stock 56 is unwound from the roll 52.

The system illustrated in FIG. 1 for making my new thermal transfer label stock admits many variations, including changes to the starting materials and changes to the order and number of the operations. For example, the facestock 12 could be preprinted on the roll 10, and the ribbon 16 could be precoated with the layer of release 34. The fugitive adhesive 40 could be applied in advance to either the front face 26 of the facestock or the front face 36 of the ribbon. The adhesive 30 could also be applied at various times including before or after the facestock 12 and the ribbon 16 are laminated together. The layers of adhesive 30 and release 34 could also be applied in matching patterns, and the fugitive adhesive 40 could be replaced by static cling.

The cutter 46 could be arranged to partially separate the labels 50 by a series of perforations; and a binder, such as the fugitive adhesive 40, would no longer be needed to transport the labels 50 with the ribbon 16. Cutting could also be performed along with subsequent thermal transfer printing operations on either fixed or variable length labels.

- 9 -

Another embodiment of my new label stock, manufacturable by a similar system, is shown in FIGS. 5 and 6. Similar to the preceding embodiment, the present label stock includes a facestock 60 having front and back faces 62 and 64 and a ribbon 66 having front and back faces 68 and 70. The front face 62 of the facestock is adapted for receiving thermal transfer ink, and the back face 64 of the facestock is covered by a layer of adhesive 72. The front face 68 of the ribbon is covered by a layer of thermal transfer ink 74, and the back face 70 of the ribbon is covered by a layer of release 76.

Also similar to the preceding embodiment, the front and back faces 62 and 64 of the facestock can be printed with ink 78 in predetermined patterns or colors. The cutter 46 could also be used to divide the facestock 60 into individual labels separated by perforations. However, in contrast to the preceding embodiment, the adhesive 72 of the facestock back face 64 is laminated to the release 76 of the ribbon back face 70. This simplifies manufacture by providing an immediate cover for the adhesive 72. When wound into a roll 80, the thermal transfer ink 74 on the ribbon front face 68 of one coil contacts the facestock front face 62 of another coil. The front face 62 of the facestock also forms the outermost layer of the roll 80. However, the completed label stock 82 could also be wound with the ink 74 on the ribbon front face 68 forming the outermost layer.

FIGS. 7 and 8 show how the two embodiments can be printed and dispensed. In FIG. 7, the roll 52 of new label stock 56 is unrolled into a thermal transfer printer 84 for printing unique information on the individual labels 50. The binder, e.g., fugitive adhesive 40 (see FIGS. 2-4), is strong enough to overcome any bonding between the layers of adhesive 30 and release 34 to insure that the labels 50 remain attached to the ribbon 16 for transport through the printer 84. However, if static cling is used as a binder, a static

- 10 -

remover may be required to limit static discharges that could damage the printer 84.

After printing, a dispenser 86 provides for separating the individual labels 50 from the ribbon 16, which is subsequently rewound into a roll 88 for disposal. Although illustrated as separate processing stages, the functions of dispensing and rewinding are preferably incorporated into the printing device.

In FIG. 8, the facestock 60 of label stock 82 is inverted with respect to the ribbon 66 upon unwinding from the roll 80. This separates the adhesive layer 72 of the facestock from the release layer 76 of the ribbon and positions the front face 62 of the facestock against the thermal transfer ink 74 of the ribbon. In other words, the facestock 60 and the ribbon 66 are relaminated together similar to corresponding layers of the first embodiment. The relaminated label stock is appropriately ordered for printing by thermal transfer printer 90.

After thermal transfer printing on fixed or variable lengths of the facestock 60, a cutter 92 divides the facestock 60 into individual labels 94 of corresponding lengths. The ribbon 66 can be cut together with the facestock 60 for dispensing with the labels or can be separately rewound onto a roll similar to the printing system of FIG. 7. Instead of cutting, the facestock 60 could be perforated or aligned with a tear bar for manually separating the facestock 60 into the individual labels 94.

FIG. 9 illustrates an internal transportation system for my new label stock 96 within a thermal printer 98. The new label stock 96 is guided within the printer 98 by a belt 100 that engages an adhesive layer 102 of the label stock 96 with an endless release surface. The belt 100, which can be coated with a layer of release to prevent the adhesive from sticking, guides the new label stock 96 between

- 11 -

a thermal transfer print head 104 and a platen 106. The print head 104 applies a controlled pattern of heat to the back face of the thermal transfer ribbon (see preceding embodiments) for transferring printed images onto the front face of the facestock.

The internal transportation system could also be used to transport other types of self-adhesive facestock through thermal printers, including thermal transfer printers and direct thermal printers. Another such facestock is a self-wound direct thermal printable stock disclosed in my copending application no. 08/202,838 filed on February 28, 1994. The entire disclosure of this application is hereby incorporated by reference.

- 12 -

I CLAIM:

1. A roll of thermal transfer label stock comprising:
 - a first substrate having front and back faces;
said front face of the first substrate adapted for receiving thermal transfer ink;
 - an adhesive layer covering at least a portion of said back face of the first substrate;
 - a second substrate having front and back faces;
 - a thermal transfer ink layer covering at least a portion of said front face of the second substrate;
 - a release layer covering at least a portion of said back face of the second substrate; and
 - said first and second substrates being laminated and wound together into coils such that said adhesive layer of the first substrate contacts said release layer of the second substrate.
2. The roll of claim 1 in which said first substrate is cut against said second substrate.
3. The roll of claim 2 in which said cut divides portions of said first substrate into individual labels that are carried by said second substrate.
4. The roll of claim 3 in which said second substrate is a film that resists splitting apart upon partial penetration of a cutting tool.
5. The roll of claim 3 in which said first substrate is a paper that promotes splitting apart upon partial penetration of a cutting tool.
6. The roll of claim 5 in which said first substrate is butt cut into the individual labels.

- 13 -

7. The roll of claim 1 in which said adhesive layer of the first substrate within one coil contacts said release layer of the second substrate within another coil.

8. The roll of claim 7 in which said release layer forms an outer surface of the roll.

9. The roll of claim 7 further comprising a binder for tacking said first and second substrates together.

10. The roll of claim 9 in which said binder is a fugitive adhesive located between said front faces of the substrates.

11. The roll of claim 10 in which said fugitive adhesive exhibits greater bonding strength between said front faces of the substrates than is exhibited by said adhesive and release layers between said back faces of the substrates.

12. The roll of claim 10 in which said fugitive adhesive is applied in a pattern.

13. The roll of claim 12 in which said fugitive adhesive is applied in strips.

14. The roll of claim 13 in which gaps are formed in said strips of fugitive adhesive to release air between said front faces.

15. The roll of claim 14 in which said fugitive adhesive is applied to edges of said front face of the second substrate.

16. The roll of claim 1 in which said front face of the first substrate within one coil contacts said thermal transfer ink layer of the second substrate within another coil.

SUBSTITUTE SHEET (RULE 26)

- 14 -

17. The roll of claim 16 in which said front face of the first substrate forms an outer surface of the roll.

18. In a self-adhesive thermal transfer label of the type comprising:

a substrate having first and second faces;
said first face of the substrate being receptive to thermal transfer ink;

an adhesive on said second face of the substrate;
a liner having first and second faces; and
a release on said first face of the liner for protecting said adhesive prior to use;

the improvement wherein a thermal transfer ink is carried on said second face of the liner for transferring images onto said first face of the substrate.

19. The label of claim 18 in which said first face of the substrate is laminated against said second face of the liner.

20. The label of claim 19 further comprising a fugitive adhesive located between said first face of the substrate and said second face of the liner.

21. The label of claim 20 in which said fugitive adhesive is applied in strips to edges of said second face of the liner.

22. The label of claim 21 in which gaps are formed in said strips of fugitive adhesive to release air between said substrate and said liner.

23. The label of claim 18 in which said substrate is divided into individual labels carried by said liner.

24. The label of claim 23 further comprising a binder for tacking said substrate and said liner together.

- 15 -

25. The label of claim 24 in which said binder is a fugitive adhesive that is applied in a pattern between said first face of the substrate and said second face of the liner for attaching the individual labels to the liner.

26. The label of claim 25 in which said fugitive adhesive exhibits greater bonding strength between said first face of the substrate and said second face of the liner than is exhibited by said adhesive and release between said second face of the substrate and said first face of the liner.

27. The label of claim 23 in which said liner is a film that resists splitting apart upon partial penetration of a cutting tool.

28. The label of claim 18 in which said second face of the substrate is laminated against said first face of the liner.

29. The label of claim 28 in which said substrate is divided into individual labels by series of perforations.

30. The label of claim 18 in which said thermal transfer ink is made from a material that melts from said liner upon application of heat to said first face of the liner.

31. The label of claim 30 in which a non-thermal ink is also applied to one of said faces of the substrate.

32. A method of making labels comprising the steps of:

applying an adhesive to a back face of a thermal transfer facestock;

applying a release coating to a back face of a thermal transfer ribbon;

- 16 -

laminating said facestock and said ribbon together;
and
winding said laminated facestock and ribbon into a
roll.

33. The method of claim 32 including the further
step of dividing the facestock into individual labels.

34. The method of claim 33 in which said step of
dividing separates the individual labels by a series of
perforations.

35. The method of claim 33 in which said step of
dividing includes cutting the facestock against the ribbon.

36. The method of claim 35 in which said step of
dividing cuts the facestock into individual labels that are
carried by the ribbon.

37. The method of claim 36 in which said step of
dividing includes butt cutting the facestock.

38. The method of claim 33 in which said step of
laminating includes laminating a front face of the facestock
against a front face of the ribbon.

39. The method of claim 38 including the further
step of binding the facestock and the ribbon together.

40. The method of claim 39 in which said step of
binding includes applying a fugitive adhesive between the
front face of the facestock and the front face of the ribbon
prior to said step of laminating.

41. The method of claim 40 in which the fugitive
adhesive is applied in a pattern that adheres the individual
labels to the ribbon.

- 17 -

42. The method of claim 41 in which the fugitive adhesive is applied in strips along edges of the ribbon.

43. The method of claim 32 including the further step of unwinding the roll of laminated web and ribbon into a printer.

44. The method of claim 43 including the further step of applying a controlled pattern of heat to the back face of the thermal transfer ribbon for transferring printed images onto a front face of the facestock.

45. The method of claim 44 including a further step of printing onto one of the front and back faces of the facestock before said step of unwinding the roll.

46. The method of claim 45 in which said further step of printing is performed with a press.

47. The method of claim 32 in which said laminating step includes laminating the back face of the facestock against the back face of the ribbon.

48. The method of claim 47 including the further steps of separating the laminated back faces of the facestock and ribbon and relaminating a front face of the facestock against a front face of the ribbon.

49. The method of claim 48 in which said further steps of separating and relaminating take place after said winding step.

50. The method of claim 49 including the further step of thermal transfer printing onto the front face of the facestock by applying heat to the ribbon following said further steps of separating and relaminating.

- 18 -

51. The method of claim 50 including the further step of dividing the facestock into individual labels.

52. The method of claim 51 in which said step of dividing separates individual labels by a series of perforations.

53. The method of claim 32 including the further step of applying a fugitive adhesive between a front face of the facestock and a front face of the ribbon.

54. The method of claim 53 in which the fugitive adhesive is applied in a pattern.

55. The method of claim 54 in which the fugitive adhesive is applied in strips along edges of the ribbon.

56. The method of claim 55 in which gaps are formed in the strips to release air between the facestock and the ribbon.

57. A method of thermal transfer printing self-adhesive labels comprising the steps of:

unwinding a thermal transfer facestock having adhesive on its back face and a thermal transfer ribbon having release on its back face from a common roll;

positioning thermal transfer ink on a front face of the ribbon against a front face of the facestock; and

applying a controlled pattern of heat to the back face of the thermal transfer ribbon for transferring printed images onto the front face of the facestock.

58. The method of claim 57 in which the facestock is divided into individual labels, and including the further step of transporting the individual labels on the ribbon.

- 19 -

59. The method of claim 58 including the further step of dispensing the individual labels from the ribbon.

60. The method of claim 59 including the further step of rewinding the ribbon independently of the facestock.

61. The method of claim 58 including the further step of dispensing the individual labels together with sections of the ribbon.

62. The method of claim 57 including the further step of separating the back faces of the facestock and ribbon.

63. The method of claim 62 in which said further step of separating takes place before said step of positioning.

64. The method of claim 57 including the step of transporting the facestock and ribbon on a belt having an endless release surface in contact with the adhesive on the back face of the facestock.

65. The method of claim 64 in which the belt guides the facestock and ribbon between a thermal print head and a platen.

66. A method of printing self-adhesive labels comprising the steps of:

entering a facestock having a front face adapted for printing and a back face at least partially covered by an adhesive into a thermal printer;

transporting the facestock within the printer on a belt having an endless release surface in contact with the adhesive on the back face of the facestock; and

guiding the facestock on the belt between a thermal print head and a platen.

- 20 -

67. The method of claim 66 including the further step of unwinding the facestock together with a thermal transfer ribbon from a common roll.

68. The method of claim 67 in which the thermal transfer ribbon has thermal transfer ink on a front face and a release on a back face, and including the further step of positioning the thermal transfer ink on the front face of the ribbon against the front face of the facestock.

69. The method of claim 68 including the further step of separating the back faces of the facestock and ribbon after said step of unwinding and before said step of positioning.

70. The method of claim 68 including the further step of applying a controlled pattern of heat to the back face of the thermal transfer ribbon for transferring printed images onto the front face of the facestock.

1 / 4

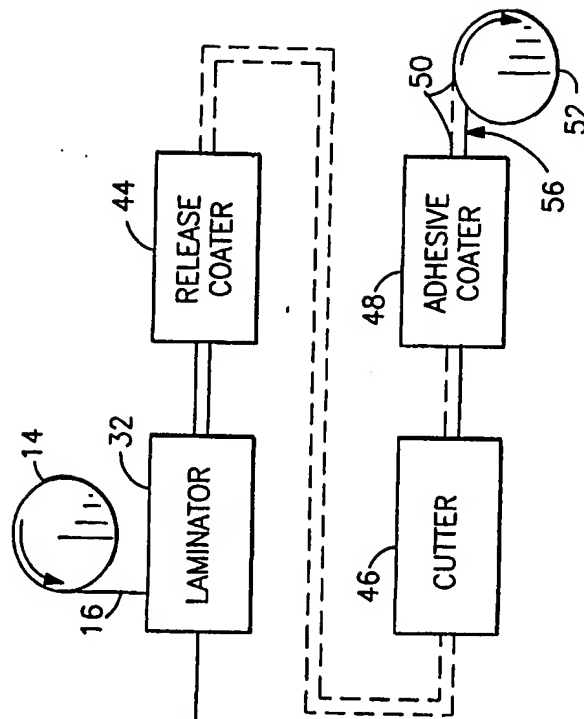


FIG. 1

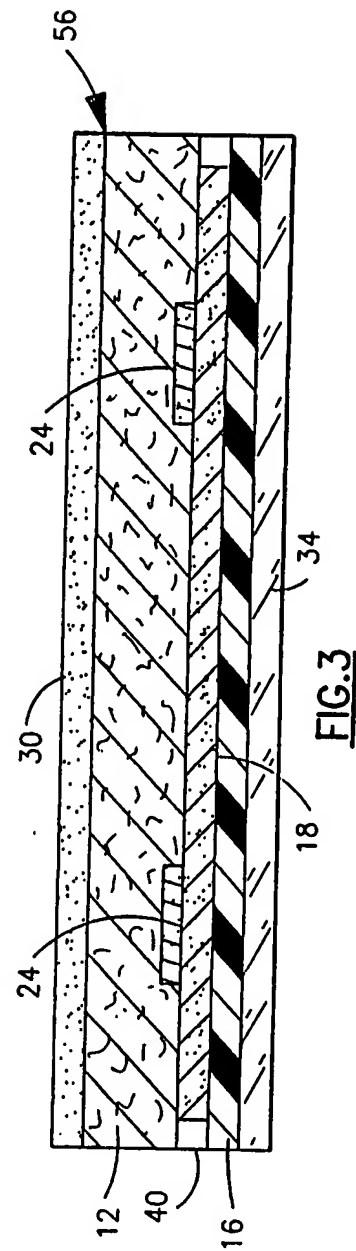


FIG. 3

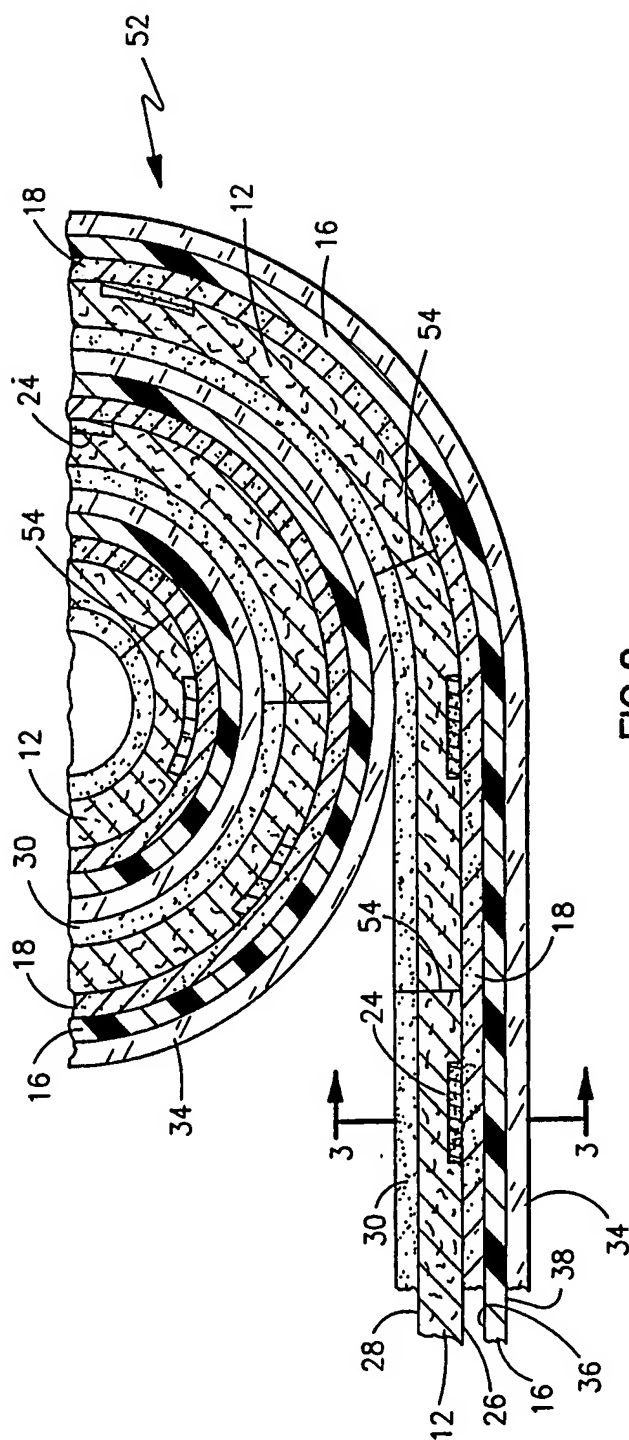


FIG. 2

3/4

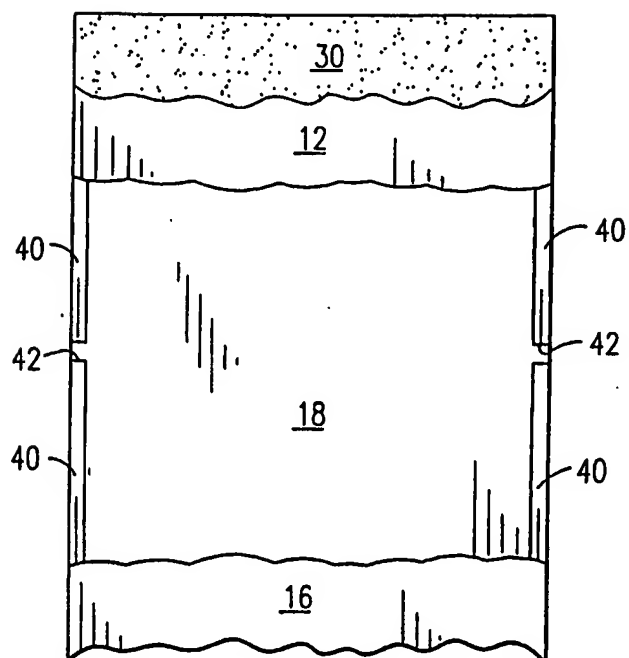


FIG. 4

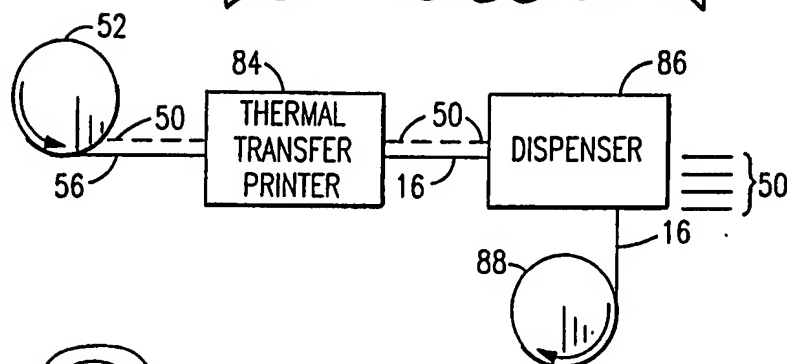


FIG. 7

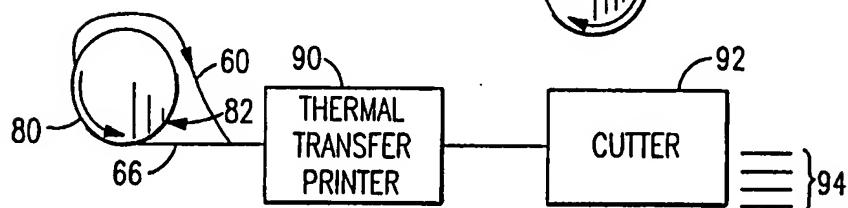


FIG. 8

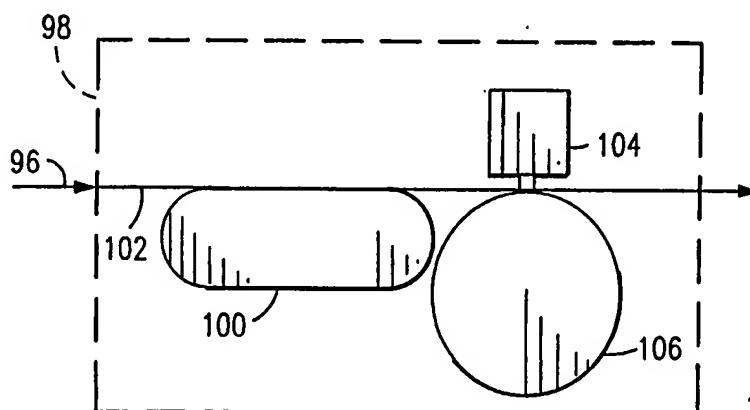
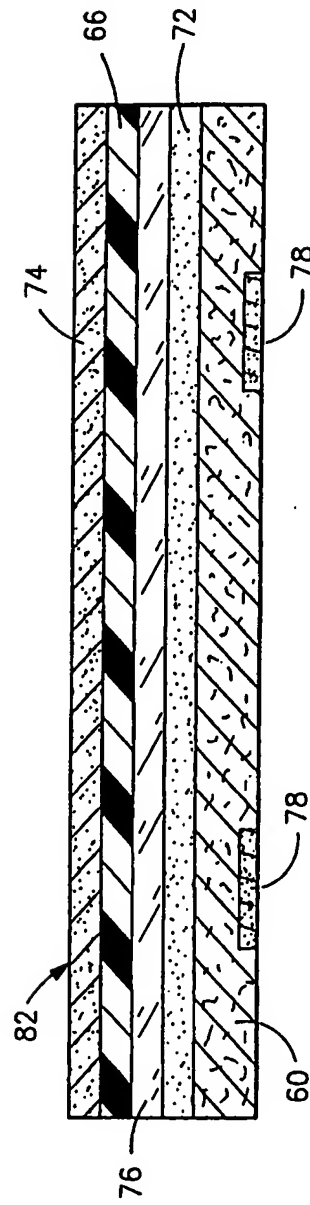
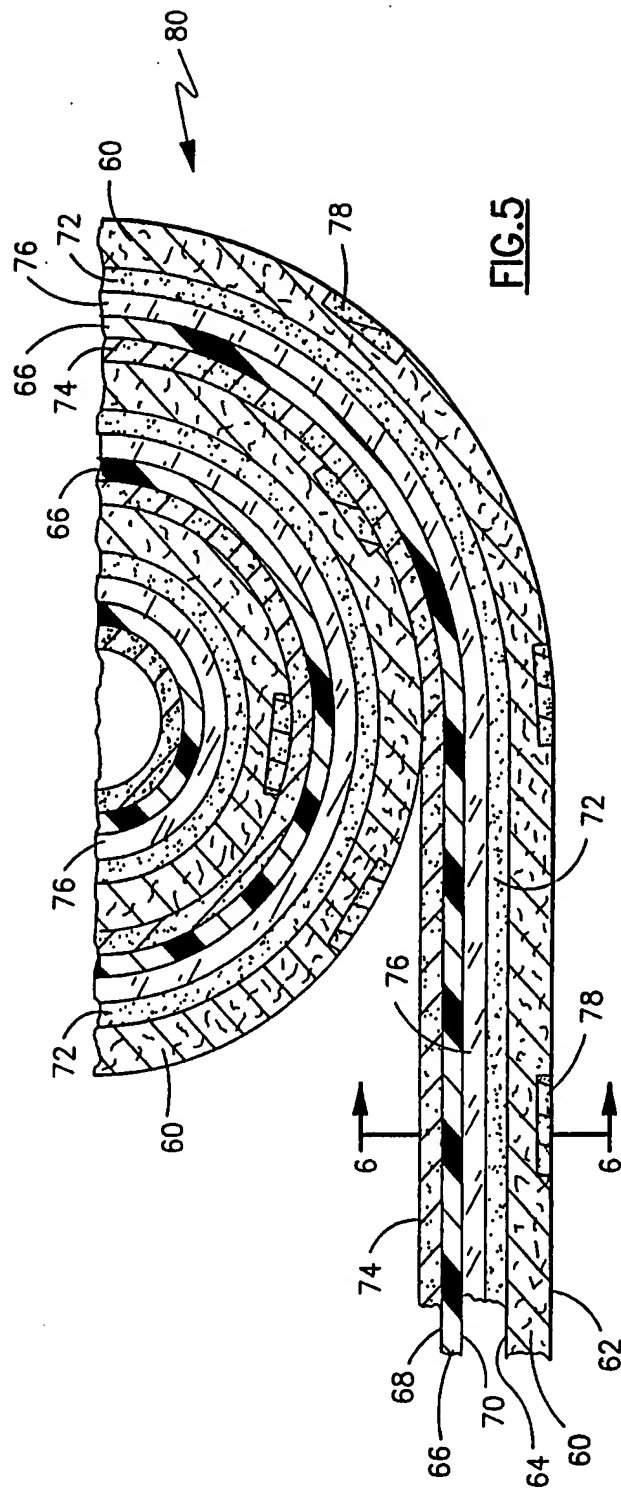


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No
PCT/US 95/05248

A. CLASSIFICATION OF SUBJECT MATTER IPC 6 G09F3/10 G09F3/02 B31D1/02 B41M5/38		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 6 G09F B31D B41M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP,A,0 637 547 (PREMARK FEG CORP) 8 February 1995 see the whole document ---	66
A	EP,A,0 314 592 (DUPORT JEAN CLAUDE) 3 May 1989 see the whole document ---	1, 18, 32, 57, 66
A	EP,A,0 579 430 (MOORE BUSINESS FORMS INC) 19 January 1994 see the whole document ---	1, 18, 32, 57, 66
A	EP,A,0 419 236 (DAINIPPON PRINTING CO LTD) 27 March 1991 see the whole document ---	1, 18, 32, 57, 66
-/--		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search 11 August 1995		Date of mailing of the international search report 06. 09. 95
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 LV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 cpo nl, Fax (+ 31-70) 340-3016		Authorized officer Gallo, G

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 95/05248

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 442 823 (TOMOEAWA PAPER CO LTD) 21 August 1991 see the whole document ---	1, 18, 32, 57, 66
A	EP,A,0 577 241 (MOORE BUSINESS FORMS INC) 5 January 1994 ---	
A	EP,A,0 373 954 (ESSELTE METO INT GMBH) 20 June 1990 ---	
A	US,A,5 226 994 (BREEN THOMAS J) 13 July 1993 ---	
P,A	EP,A,0 600 622 (MOORE BUSINESS FORMS INC) 8 June 1994 -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Information Application No
PCT/US 95/05248

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0637547	08-02-95	AU-B- 6887194 CA-A- 2129068 JP-A- 7172006	09-02-95 03-02-95 11-07-95
EP-A-0314592	03-05-89	FR-A- 2622146 JP-A- 1141777 US-A- 5037219	28-04-89 02-06-89 06-08-91
EP-A-0579430	19-01-94	US-A- 5292713 AU-B- 4190193 CA-A- 2100501 JP-A- 6072024	08-03-94 20-01-94 16-01-94 15-03-94
EP-A-0419236	27-03-91	JP-A- 3224795 JP-A- 3203697 JP-A- 3203698 CA-A- 2025683 US-A- 5264279 JP-A- 3178487	03-10-91 05-09-91 05-09-91 20-03-91 23-11-93 02-08-91
EP-A-0442823	21-08-91	JP-A- 3239585 JP-B- 7045262 DE-D- 69106737 US-A- 5151403	25-10-91 17-05-95 02-03-95 29-09-92
EP-A-0577241	05-01-94	AU-B- 4163293 JP-A- 6080131	06-01-94 22-03-94
EP-A-0373954	20-06-90	NONE	
US-A-5226994	13-07-93	NONE	
EP-A-0600622	08-06-94	AU-B- 5199893 CA-A- 2109638 JP-A- 6222717	09-06-94 31-05-94 12-08-94